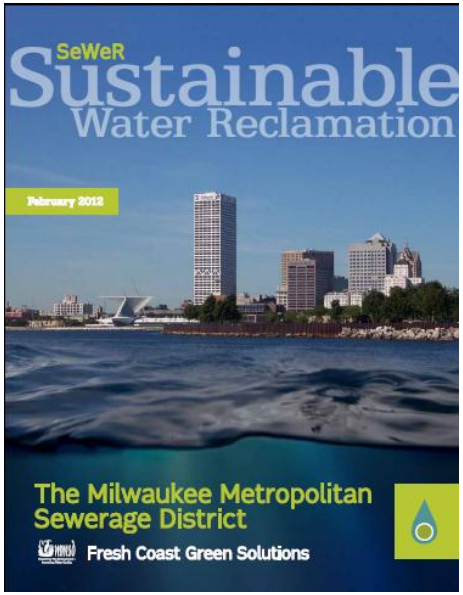
Milwaukee's Green and Grey Vision

Kevin L. Shafer, P.E.
Executive Director



MMSD
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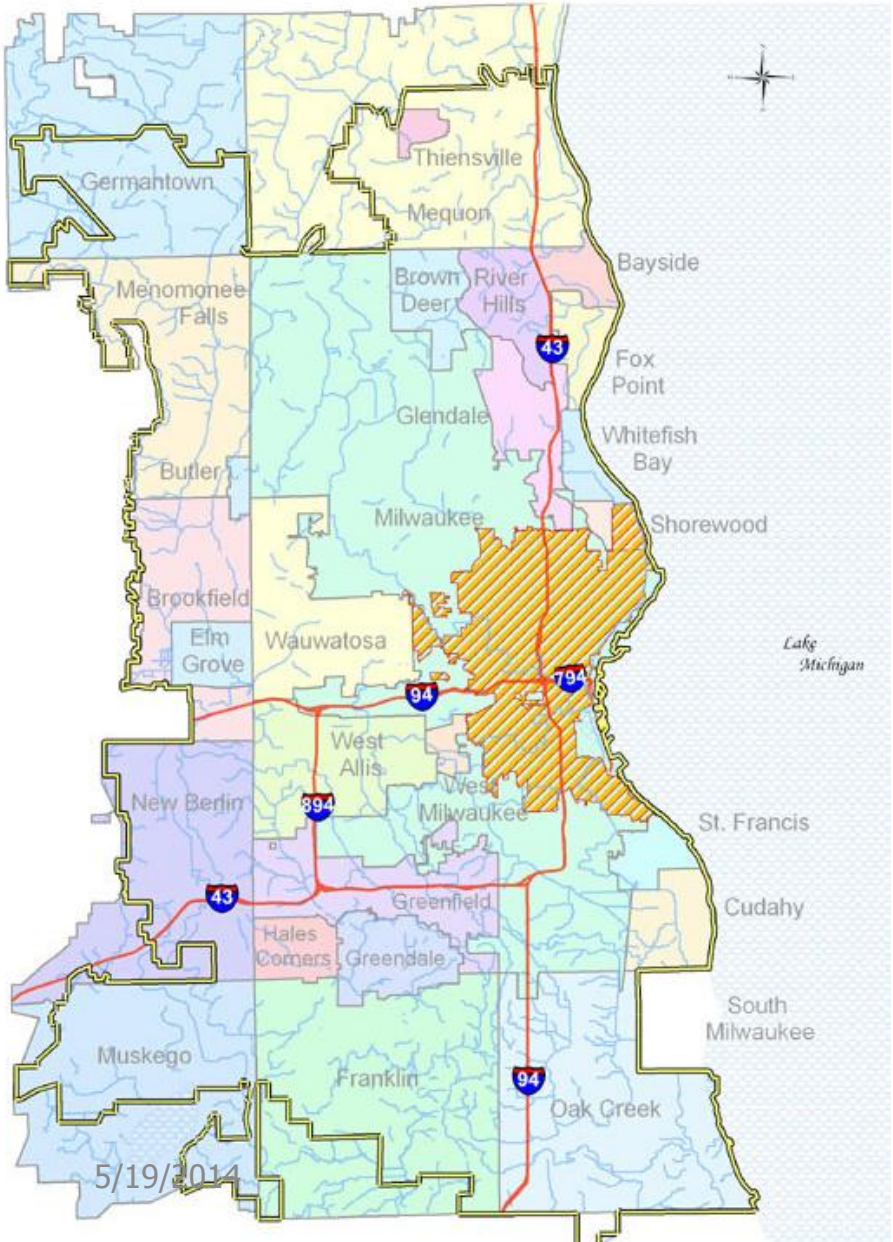
Milwaukee Metropolitan Sewerage District

Milwaukee Metropolitan Sewerage District



We Serve:

- 1.1 Million Customers
- 28 Municipalities
- 411 Square Miles

We Protect the Public & Lake Michigan:

- Convey/Store/Reclaim Wastewater
- Manage Flooding

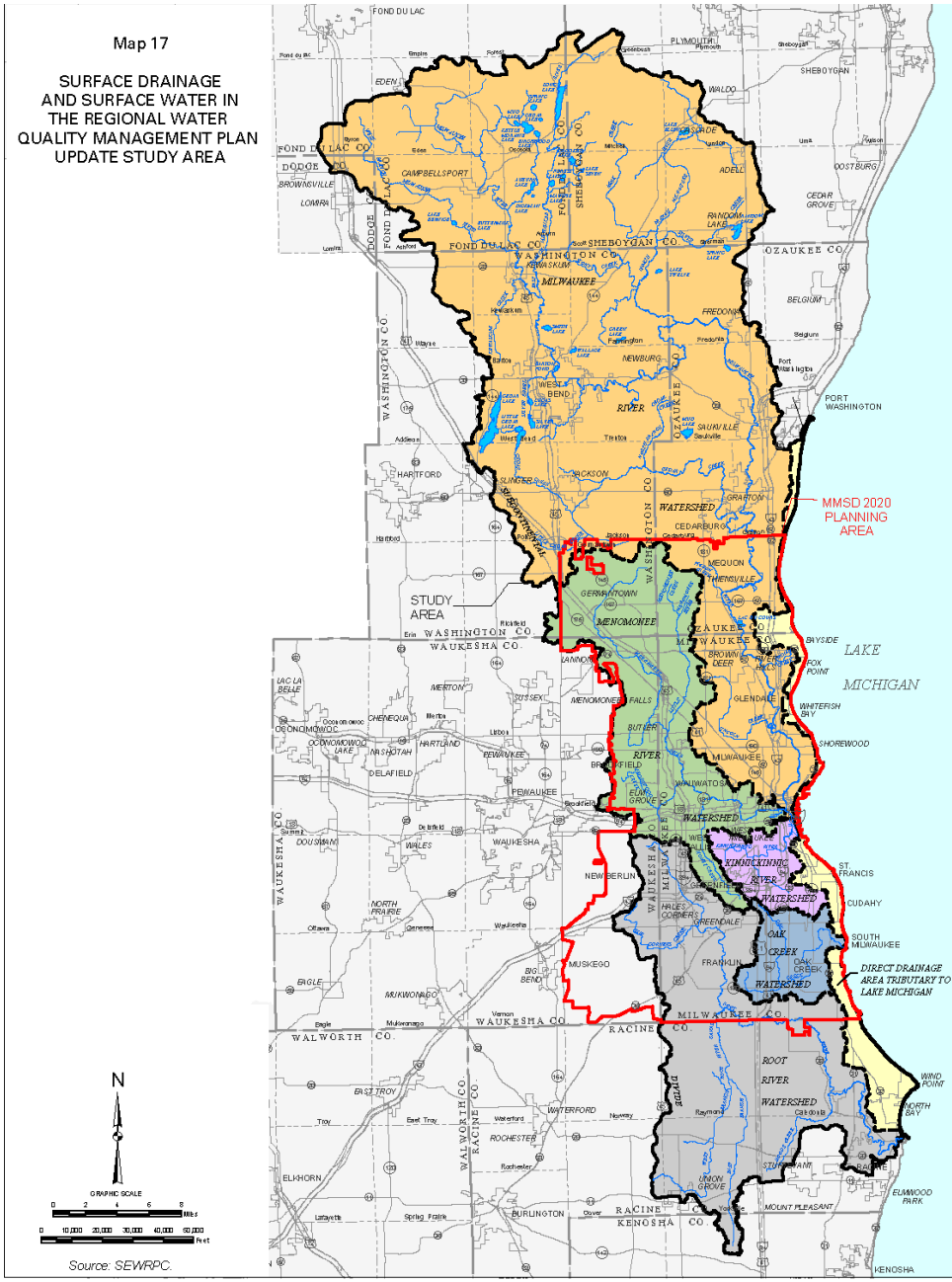
We Have:

- 300 Miles of Sewers (Municipalities and individuals have 6,000 miles!)
- 521 MG Tunnel System
- 2 Water Reclamation Facilities

The Water Quality Initiative
A Watershed Approach

Watershed	Area (square miles)
Kinnickinnic River	24.7
Menomonee River	135.8
Milwaukee River	700.0
Oak Creek	28.2
Root River	197.6
Lake Michigan Direct Drainage Area	40.7
Total	1,127.0

Number of Counties	9
Number of Local Municipalities	83



Water Reclamation Facilities

Jones Island

South Shore

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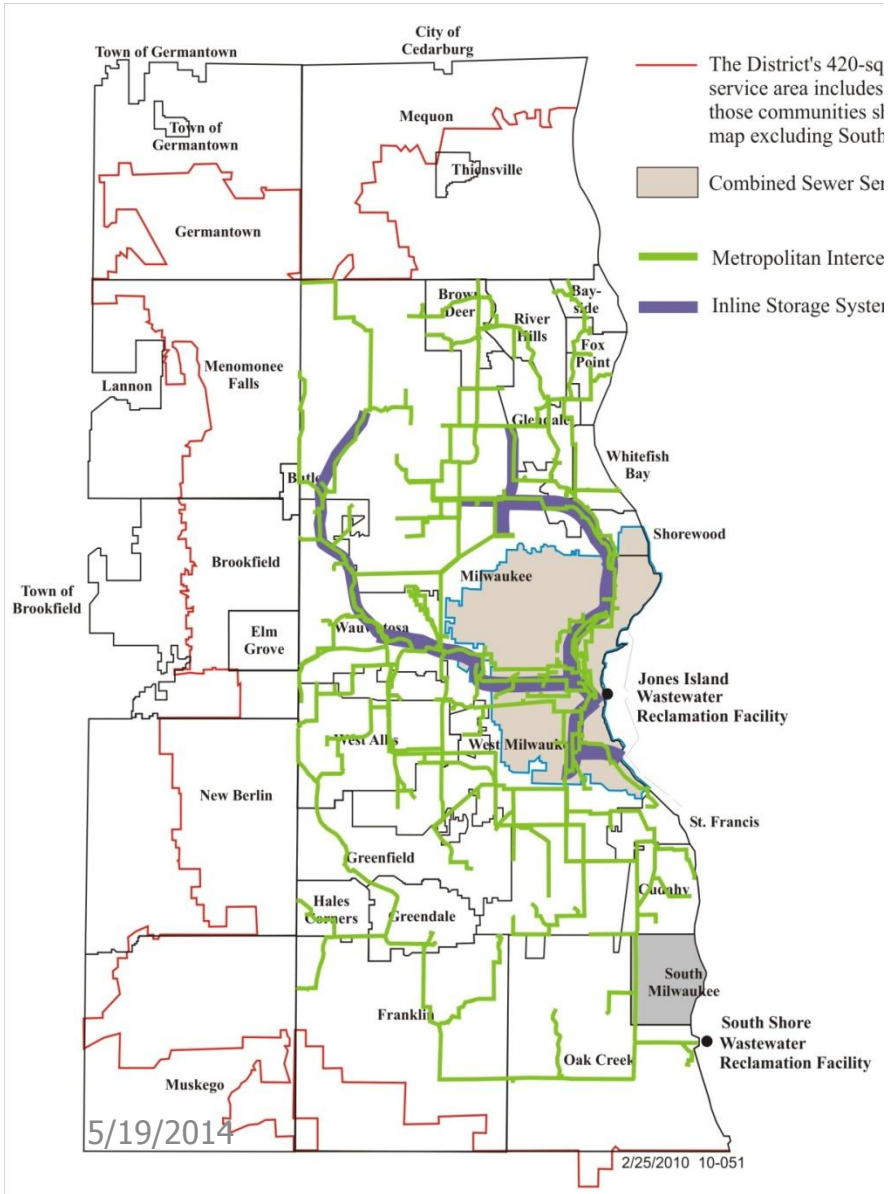
The Region's Sewers



300 Miles

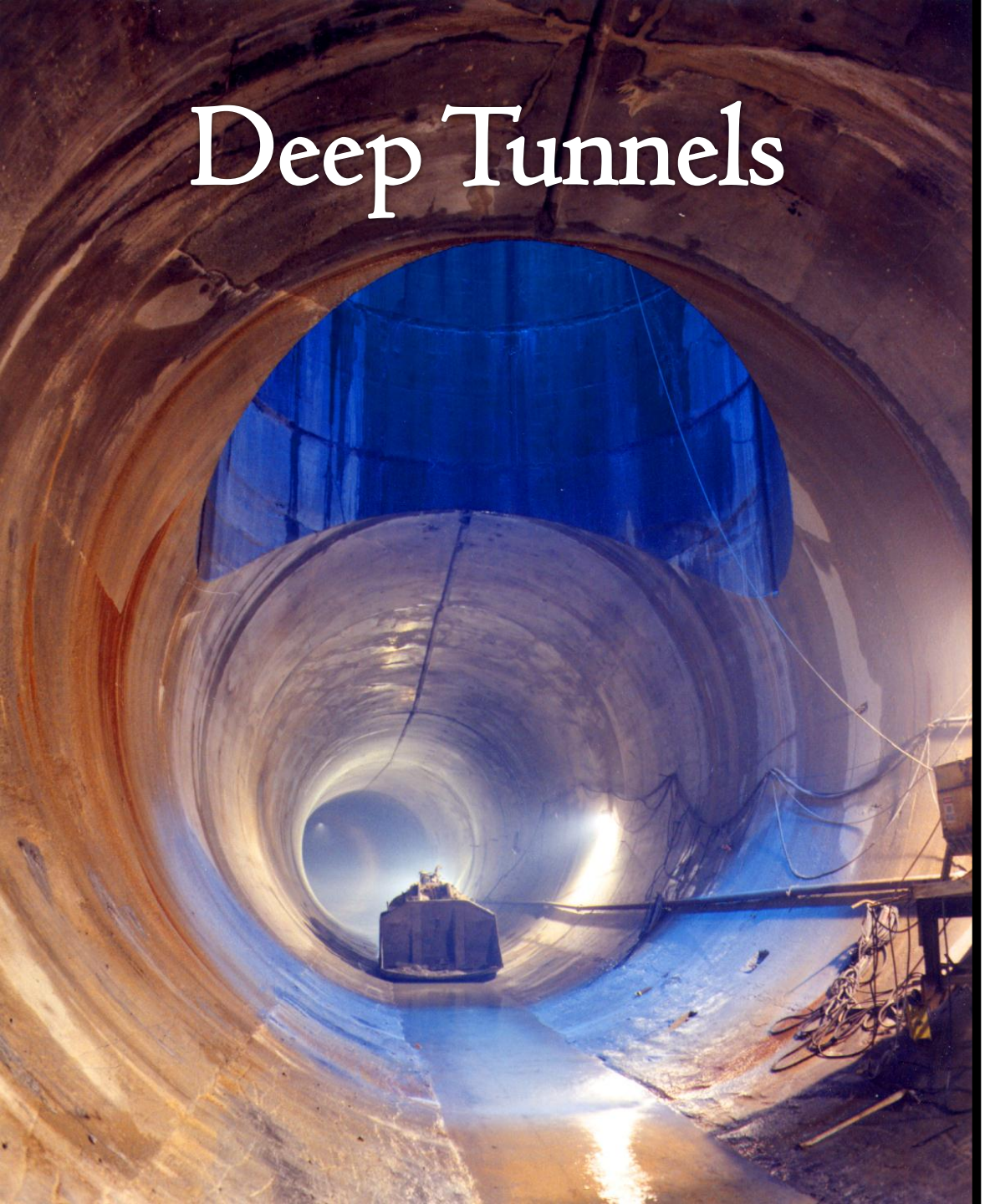
MMSD Sewers

3,000 Miles

Municipally Owned Sewers

3,000 Miles

Private Laterals



Deep Tunnels

300 Feet
Below ground

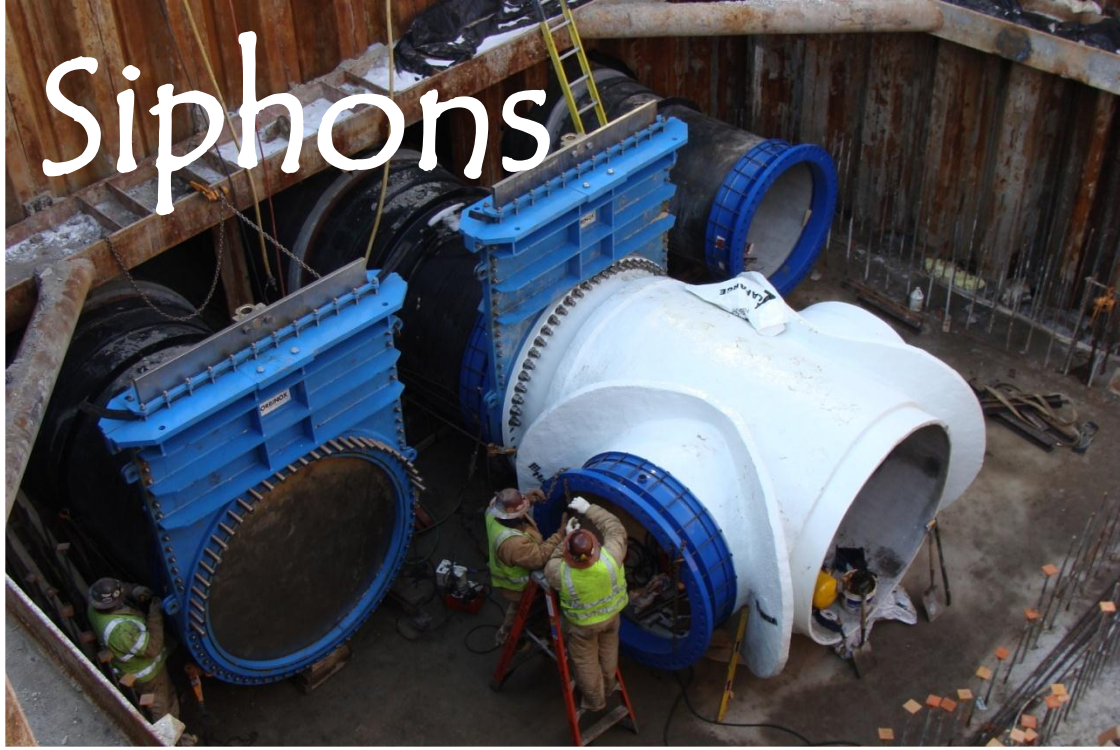
521 Million
Gallons of Storage

28.5 Miles
Long

17- to 32-feet
In Diameter

Designed to minimize basement backups and for 1-2 overflows per year.

Harbor Siphons



% OF VOLUMES CAPTURED & CLEANED

TOTAL PERCENT CAPTURE 98.3%

1994	99.7%	**1999**	94.8%	**2004**	97.9%	**2009**	98.3%
1995	98.9%	**2000**	95.6%	**2005**	99.6%	**2010**	96.1%
1996	99.0%	**2001**	99.3%	**2006**	99.9%	**2011**	99.7%
1997	97.1%	**2002**	99.3%	**2007**	99.2%	**2012**	99.9%
1998	99.1%	**2003**	99.9%	**2008**	95.1%	**2013**	98.5%

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MMSD's 2035 Vision

(http://v3.mmsd.com/NewsDetails.aspx)

Integrated Watershed Management Goals:

Zero sanitary sewer overflows

Zero combined sewer overflows

Zero homes in the 100 year floodplain

Acquire an additional 10,000 acres of river buffers through Greenseams®
Use green infrastructure to capture the first 0.5 inch of rainfall

Harvest the first 0.25 gallons per square foot of area of rainfall

Energy Efficiency and Climate Mitigation & Adaptation Goals:

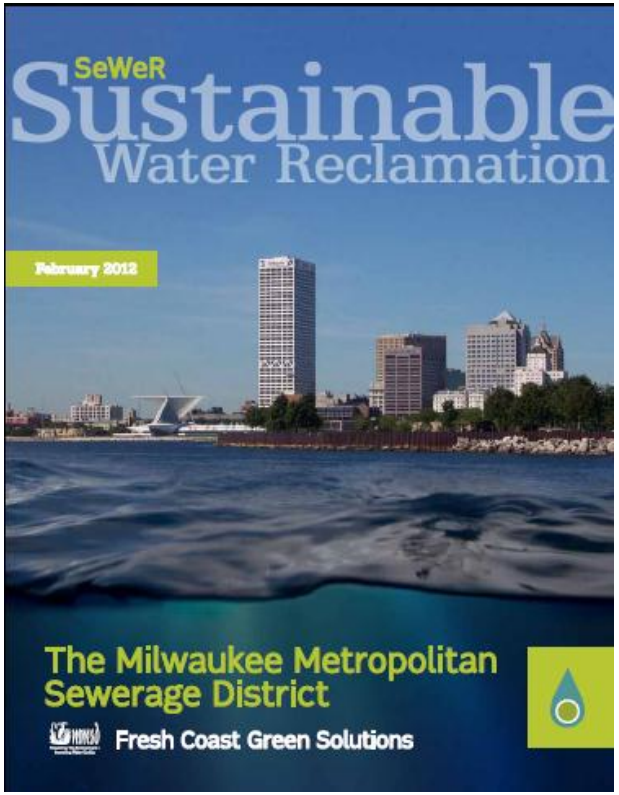
Meet 100% of MMSD's energy needs with renewable energy sources

Meet 80% of MMSD's energy needs with internal, renewable sources

Use the Greenseams® Program to provide for 30% sequestration of MMSD's carbon footprint

Reduce MMSD's carbon footprint by 90% from its 2005 baseline

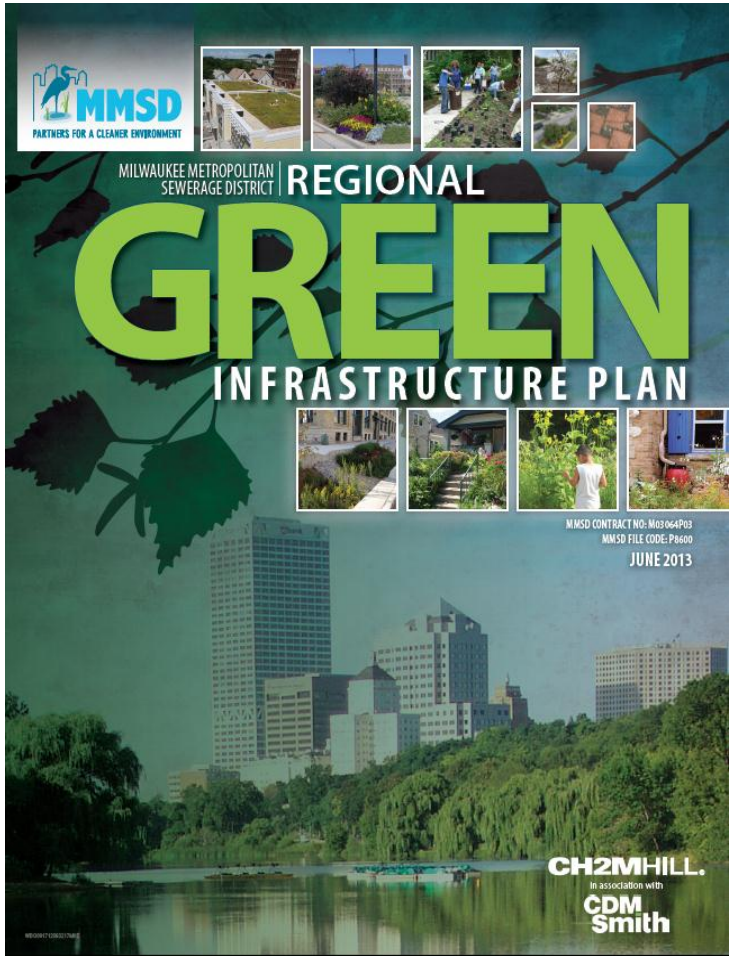
MMSD's Sustainability Plan



Although the region is rich in water, there is a recognition that water is a resource not to be squandered, but rather used for the gift it is. We do our part to manage that gift well, stewarding regional efforts and innovating approaches to carry us through the future.

MMSD's Regional Green Infrastructure Plan

- Meet new discharge permit requirement
- Capture the first 0.5" that falls on impervious surfaces or an additional 740 MG
- Prioritize green infrastructure projects



You have to start with a grey backbone…

- **Treatment Plants**
- **Sewers**
- **Storage Vessels…**

To go Green…

- **Rain Barrels**
- **Rain Gardens**
- **Bioretention…**

Green Infrastructure In Our 2013 Permit

4.10 Wet Weather Management – Green Infrastructure

"…The practices/control measures put in place in 2013 must cumulatively have a design retention capacity of at least 1 million gallons, and each following calendar year during the permit term an additional 1 million gallons of green infrastructure retention capacity must be put in place..."

What is Green Infrastructure (GI)?

10 GREEN INFRASTRUCTURE DEFINITIONS

Green infrastructure is an approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. At the largest scale, the preservation and restoration of natural landscape features (such as forests, floodplains and wetlands) are critical components of green stormwater infrastructure. By protecting these ecologically sensitive areas, communities can improve water quality while providing wildlife habitat and opportunities for outdoor recreation. On a smaller scale, green infrastructure practices include strategies such as rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation.

GREENWAYS

Greenways

RAIN GARDENS

Rain Gardens

BIO-SWALES

Bioswales

POROUS PAVEMENT

Porous Pavement

WETLANDS

Wetlands

STORMWATER TREES

Stormwater Trees

NATIVE LANDSCAPING

Native Landscaping

RAINWATER CATCHMENT

Rainwater Catchment

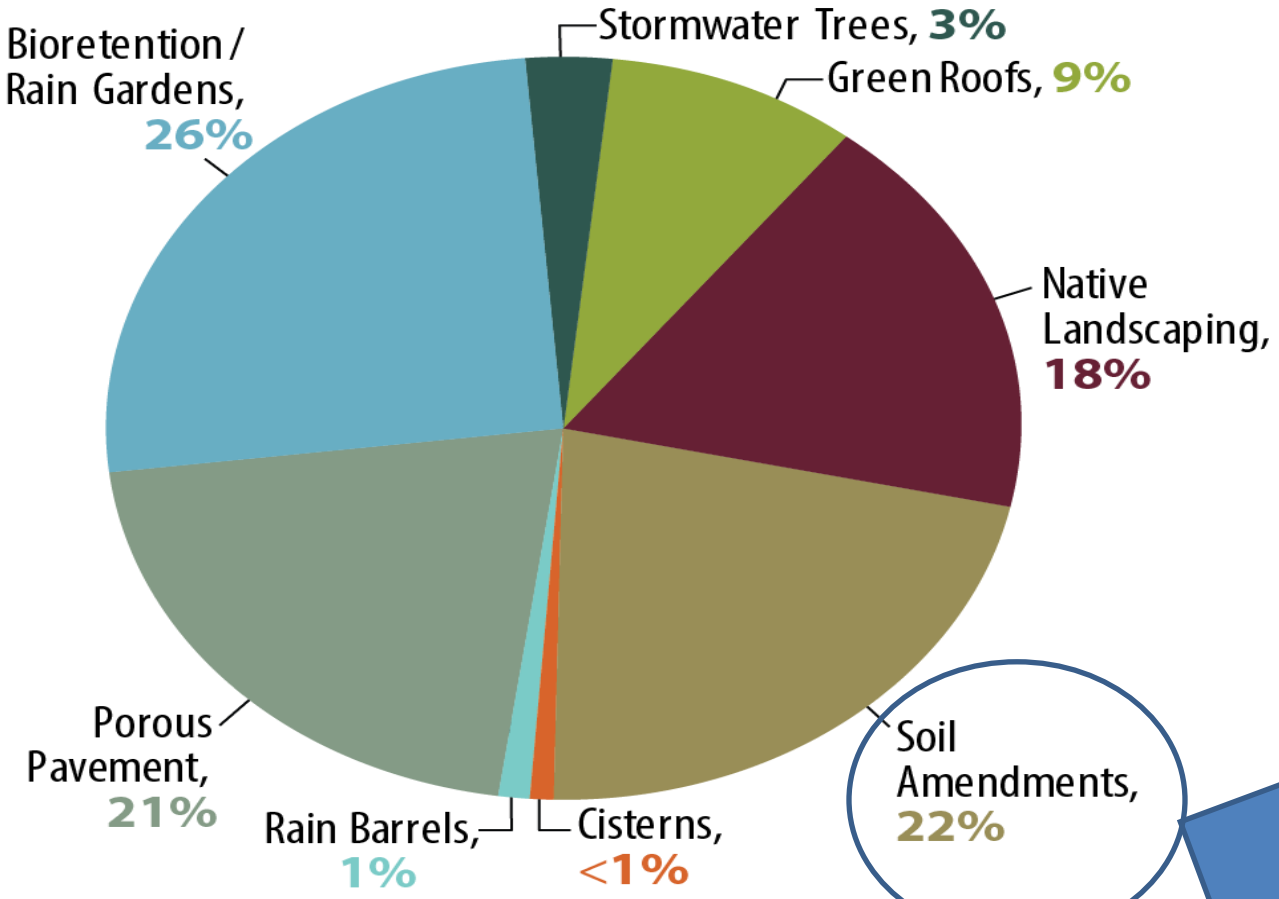
GREEN ROOFS

Green Roofs

GREEN ALLEYS, STREETS AND PARKING LOTS

Green Streets, Alleys, Parking

The mix of Green



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LAKE MICHIGAN

Rain Gardens

INITIATIVE

29,300 Plants Sold Since 2006

PSWM Rain barrels

More than

18,000

SOLD

Since 2002


Green Roofs
+10 acres
since 2003

More Green Roofs


Greenseams®
2,660
Acres

Benefits at full implementation

Economic	
Green job opportunities	633 O&M; 161 construction jobs
Reduced infrastructure costs in the CSSA	$221.8 million compared to cost of GI in CSSA of $179.5 Million
Reduced pumping and treatment costs	Reduction in the need for deep tunnel pumping and associated treatment: $1.3 million/year
Increased property values	Increase in property values due to aesthetic improvements from GI: Residential: $447.8 million Commercial: $238.2 million Industrial: $ 19.9 million Total: $705.9 million

Benefits at full implementation

Social	
Improved quality of life and aesthetics	Recreational Area Increase: 275 acres Reduced Crime & Social Program Costs
Improved green space/recreational areas	Native landscaping: 8,600 acres Bio-retention/rain gardens: 670 acres Number of trees: 738,000

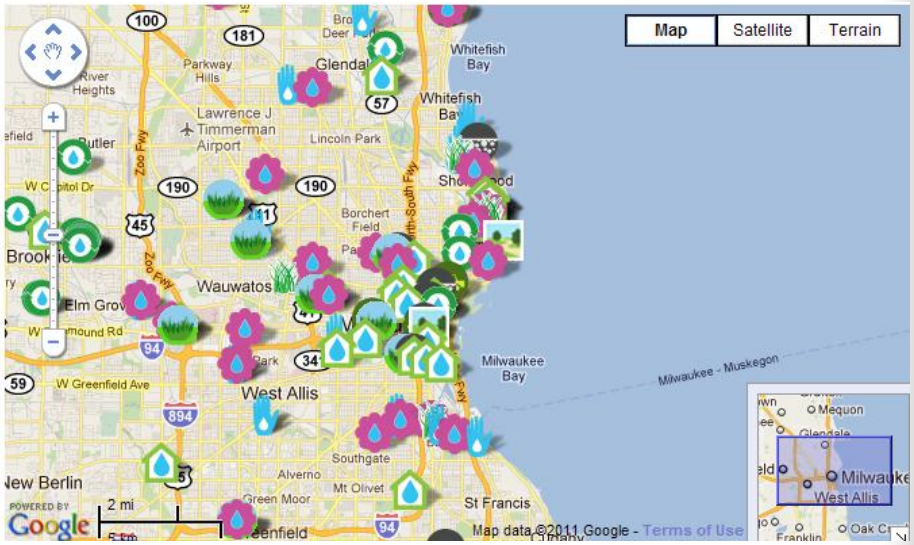
Benefits at full implementation

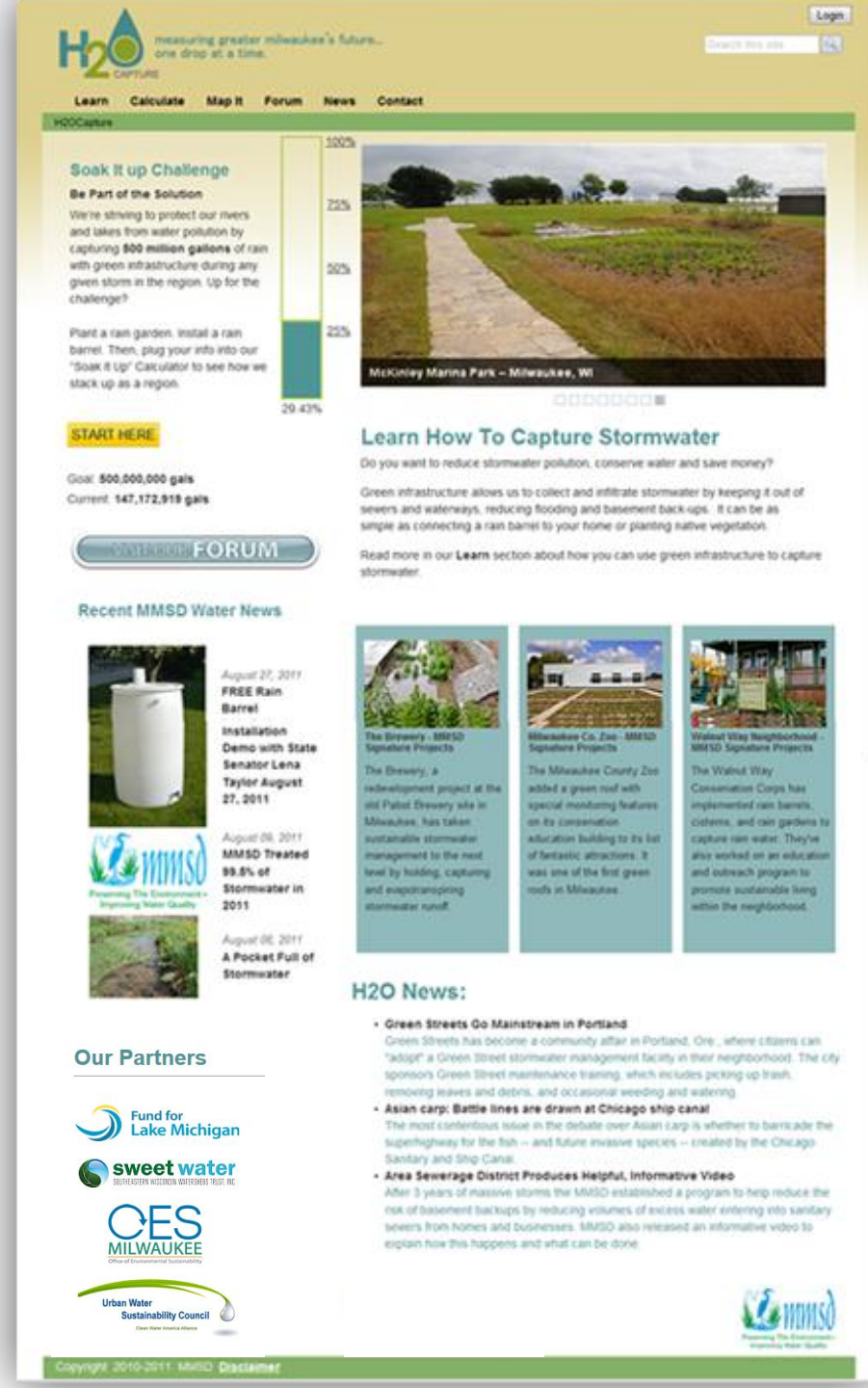
Environmental	
Captured stormwater runoff	740 MG new GI storage
Reduced pollutant loadings	Total suspended solids: 15.1 million pounds/year Total Phosphorus: 54,400 pounds/year
Carbon reduction	CO_2 sequestered plus emissions avoided due to GI-related energy savings: 73,000 tons/year Reduction costs due to effects on human health, property damages from increased flood risk, etc. $1.4 million/year

Benefits at full implementation

Environmental	
Reduced energy use for cooling	Due to the insulating properties of green roofs and tree shading: 16.5 million kWh/year Associated cost savings: $1.5 to $2.1 million
Improved air quality	Criteria air pollutants removed by trees plus emissions avoided due to GI-related energy savings: CO: 8 tons/year NO_2: 103 tons/year Ozone: 403 tons/year PM_{10}: 190 tons/year SO_2: 113 tons/year Human health benefit costs from NO_2 and SO_2 reductions: $6.4 million/year

Public Education





www.mmsd.com and
www.h2ocapture.com

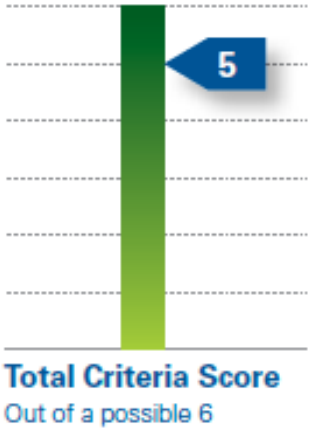
NATURAL RESOURCES DEFENSE COUNCIL

THE EARTH'S BEST DEFENSE

Rooftops to Rivers II

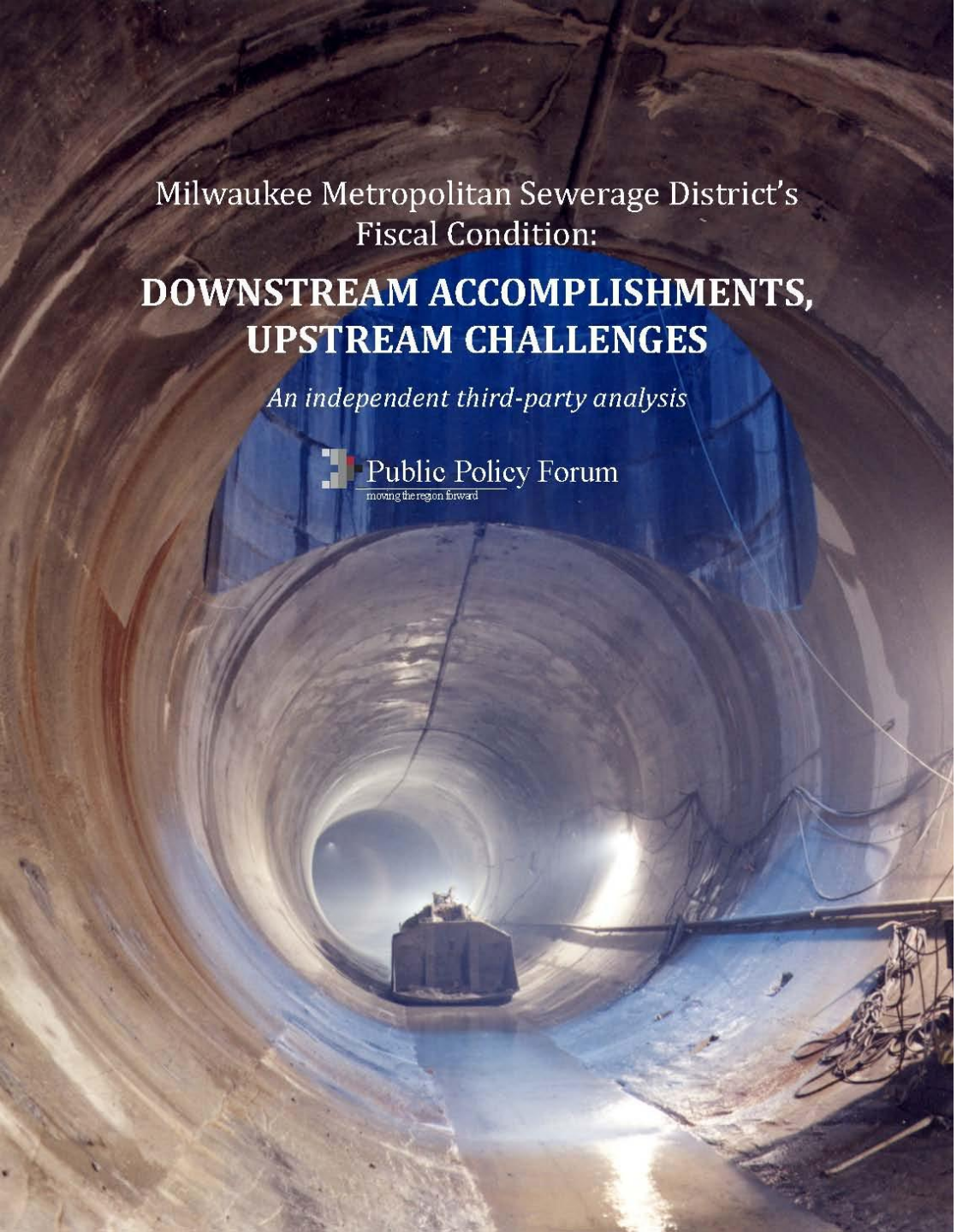
Green Strategies for Controlling Storm water and Combined Sewer Overflows

MILWAUKEE, WISCONSIN



EMERALD CITY CRITERIA*

- ☐ Long-term Green Infrastructure (GI) Plan?
- ☑ Existing requirement to use GI to reduce some portion of the existing impervious surfaces?
- ☑ Incentives for private-party actions?
- ☑ Retention Standard?
- ☑ Guidance or other affirmative assistance to accomplish GI within City?
- ☑ Dedicated funding source for GI?



"MMSD enjoys sound fiscal health and appears well-positioned for the future."

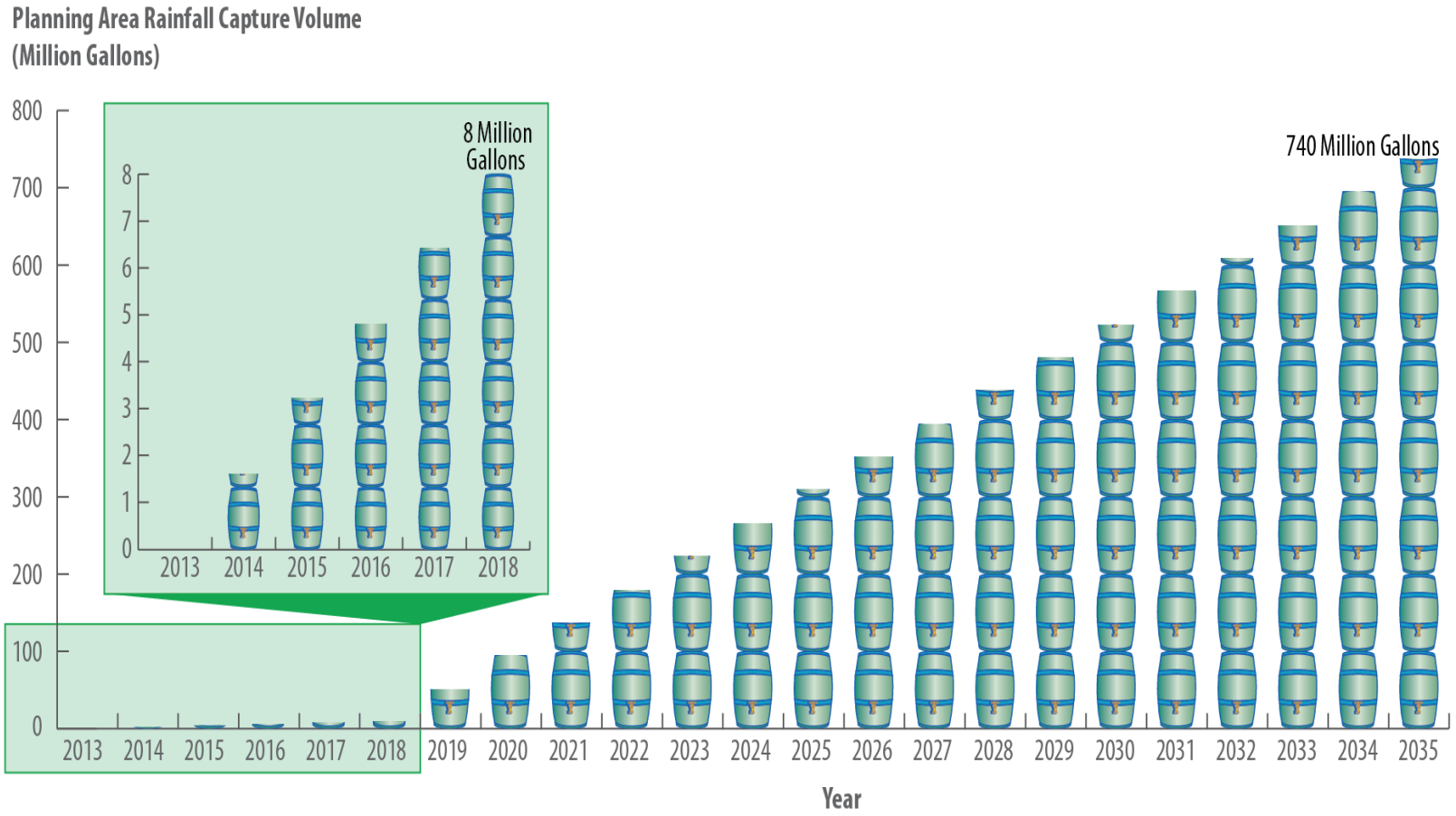
- Public Policy Forum

- Healthy operating budget
- Extensive and well-managed capital assets
- Sound performance

Southeastern WI Watersheds Trust

Success = A Regional Partnership

One step at a time…



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Milwaukee Metropolitan Sewerage District

Aesop's Tortoise (Green) and the Hare (Grey) Story


FRESH COAST 740
MILWAUKEE, WISCONSIN


Go
Green !
Go
Grey !
SPARTANS
SPARTANS